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Pseudoaneurysm of the Breast During Vacuum-Assisted Removal

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Most cases of pseudoaneurysms (PA) of the breast, which are rarely reported in the literature, occur after excisional or core needle biopsy when a punctured arterial wall fails to seal completely.[1–4] In this report, we describe a case of a PA of the breast that developed after a sonographically guided 8-gauge vacuum-assisted removal (VAR) procedure. After focused compression by the ultrasound transducer, thrombosis of the PA occurred 2 days after the VAR. To the best of our knowledge, such a case has never been reported.

Case Report

A 47-year-old woman came to the hospital because of a mass in her right breast found at another hospital. Breast sonography revealed a 15-mm hypoechoic solid mass in her right breast at the 10-o'clock position, suggestive of fibroadenoma, 4 cm from the nipple (Figure 1). The patient was anxious about breast cancer and wanted to have the mass removed by VAR. Vacuum-assisted removal with an 8-gauge vacuum-assisted probe device (Mammotome; Ethicon Endo-Surgery, Inc, Cincinnati, OH) was performed under sonographic guidance (Figure 2). However, after retrieval of the sixth VAR specimen, profuse bleeding occurred. Sonography revealed a hematoma presenting as a 1-cm hypoechoic lesion at the VAR site. Immediate hemostasis was achieved with suction from the vacuum-assisted device and compression with the ultrasound transducer. Subsequently, the vacuum-assisted device was removed, and manual compression was applied for 30 minutes. No more bleeding occurred.

Abbreviations
PA, pseudoaneurysm; VAR, vacuum-assisted removal

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Figure 1. Sonogram showing a mass in the right upper outer quadrant that is well defined but with a partially indistinct margin (arrow).

The day after the procedure, the patient came to the hospital to have the lesion checked, and a follow-up sonogram revealed a larger hematoma (≈2.4 cm) with heterogeneous overall reflectivity and an anechoic center (Figure 3). A color Doppler image revealed whirling flow in the hematoma (Figure 4), whereas power Doppler images showed vascularity connecting the hematoma to an adjacent vessel (Figure 5). An iatrogenic PA was diagnosed. Pressure was applied on the neck of the PA. After 30 minutes of hemostasis, no vascularity was noted in the neck of the PA. Therefore, the decision was made to perform additional follow-up sonography instead of additional interventional treatment such as thrombin or alcohol injection.

Two days after the original procedure, the second follow-up sonogram showed that the PA had spontaneously thrombosed. Color Doppler images revealed no flow (Figure 6). A subsequent follow-up sonogram at 3 months showed that the PA had decreased in size and had completely thrombosed (Figure 7).

Discussion

A PA or false aneurysm occurs most often after traumatic injury as a result of a puncture or tear in the arterial wall, with subsequent collection of blood in adjacent tissue that communicates with the vessel.[5,6] Pseudoaneurysms, which lack an arterial wall, are contained by perivascular tissue.[5,6] The risk of a PA is greater in female patients, the elderly, patients with atherosclerosis, and patients receiving anticoagulation therapy such as warfarin, heparin, or aspirin.[5–7]

In radiologic practice, PA formation is a well-recognized complication of vascular catheterization and percutaneous core needle biopsy of a solid organ.[7] A PA of the breast, however, is uncommon, and its natural history is not well known.[1,6] Table 1 is a summary of previous reports about PAs.

Figure 2. Sonogram showing VAR with an 8-gauge probe (arrows) of the mass in the right upper outer quadrant.

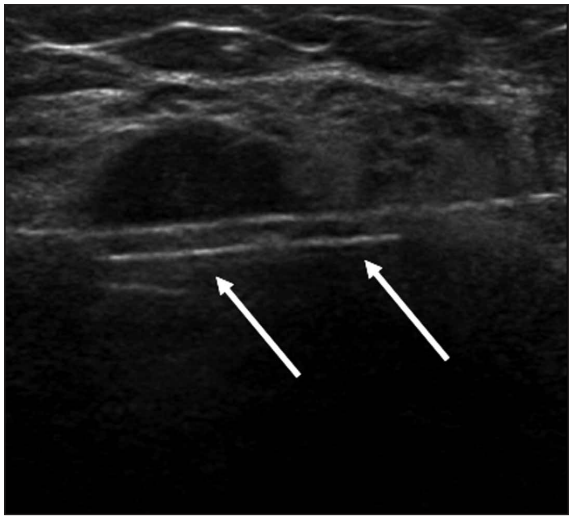
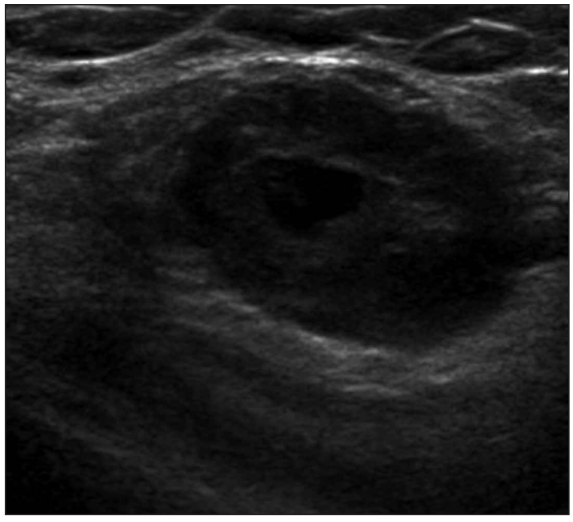


Figure 3. Sonogram showing an approximately 2.4-cm complex lesion at the site of VAR on the day after the procedure.



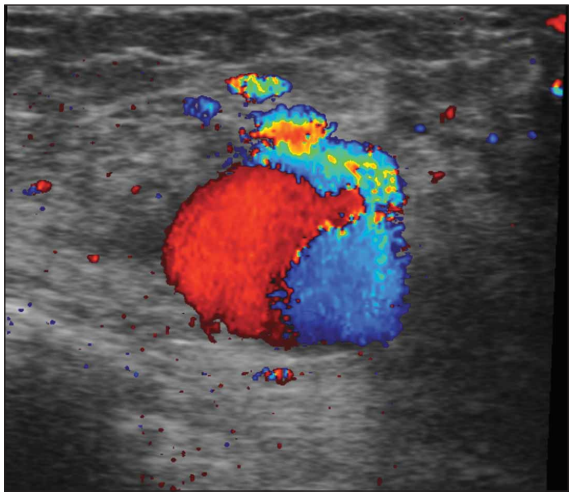


Figure 4. Color Doppler sonogram showing whirling flow in a hematoma.

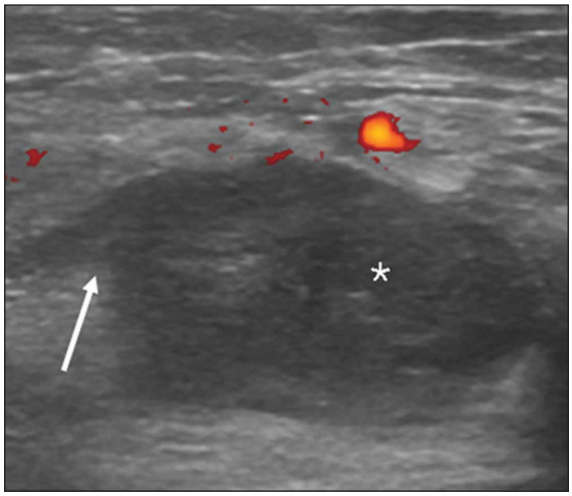


Figure 6. Follow-up sonogram 2 days after the procedure showing no flow in the neck (arrow) or center of the hypoechoic lesion, suggesting a thrombosed PA (asterisk).

Of these, 5 cases were performed with 18- or 14-gauge needle automated (n = 4) or vacuum-assisted (n = 1) biopsy under sonographic guidance.[2,3,5–7] Reported PAs ranged in size from 1 to 3 cm, with the most common size approximately 1.5 cm. In our case, the PA was 2.4 cm, one of the largest ever reported.

In this case, the PA was induced by VAR. Recently, there have been reports about VAR of benign breast lesions with large needles under sonographic guidance[8–10]; thus, the incidence of PAs as a complication of VAR is likely to continue to rise. In our case, one of the largest needles (8-gauge) that has been reported to result in an aneurysm was used, which was more risky than thinner needles. The reason for the lack of reports of PAs after VAR might be that proper hemostasis of VAR, such as suctioning of a hematoma, is often accomplished, or that 8- and 11-gauge needles are not used as commonly as

Figure 5. Power Doppler sonogram showing vascularity connecting the PA (asterisk) to an adjacent vessel (arrow) on the day after the procedure.

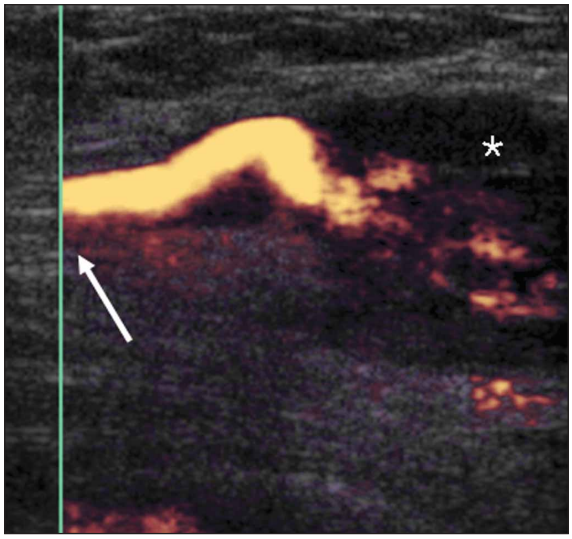


Figure 7. Follow-up sonogram after 3 months showing a completely thrombosed PA (asterisk) that has decreased in size.

Table 1. Previous Reports of PAs

Report	Causative Factor	Image Guidance	Period of Detection	Treatment	PA Size
Al Hadidy et al[1]	Trauma	None	2 d	Sonographically guided compression	1.3 cm
McNamara and Boden[2]	18-gauge core biopsy	Sonography	Immediate	Thrombin injection	1 cm
Beres et al[3]	14-gauge Mammotome	Stereotactic	6 mo	Coil embolization	1 cm
Wilkes et al[4]	Lumpectomy	None	3 mo	Surgery	5 mm
El Khoury et al[5]	14-gauge core biopsy	Sonography	3 wk	Spontaneously thrombosed	2 cm
Bazzocchi et al[6]	14-gauge core biopsy	Sonography	2 wk	Alcohol injection	1.6 cm
Dixon and Enion[7]	14-gauge core biopsy	Sonography	3 mo	Surgery	3 cm

14- and 18-gauge automated gun biopsy needles; thus, postprocedure complications are rarely reported. In addition, because sonographic guidance displays real-time images, immediate focused compression of a hematoma during the procedure is possible. Iatrogenic PAs caused by large-diameter sheaths and needles are less likely to be thrombosed by compression.[11] Although compression has been used as a first-line treatment, it is often unsuccessful. Nevertheless, our case was treated with manual compression to decrease the vascularity at the neck of the PA, with a follow-up sonogram on the day after the procedure. In previous studies, PAs were detected after at least 2 weeks to a few months, except for 2 cases. Our case was detected earlier; therefore, hemostasis by manual compression was possible. The case of Al Hadidy et al[1] was also detected early (within 2 days) and was treated successfully with sonographically guided compression. We had planned to take additional action such as thrombin injection, but because of the disappearance of the vascularity at the neck of the PA, follow-up sonography was performed instead. Other treatment techniques that have been reported in the literature include percutaneous alcohol injection,[6] thrombin injection,[2] microcoil embolization,[3] and surgical excision.[4,7] Because PAs in the breast have been rarely reported, they are generally treated like PAs in other organs. In our case, although the PA was not small, treatment with sonographically guided compression was possible; however, further study of treatment according to the size of the PA and the detection period is necessary.

Physicians should be aware that PAs could be complications of VAR and should properly explain the treatment options to patients. Color flow evaluation to map vessels near a lesion before biopsy can help prevent complications of a PA or hematoma during an interventional procedure. If a PA does occur, we recommend first applying manual compression and then, if necessary, performing an additional procedure such as embolization.

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